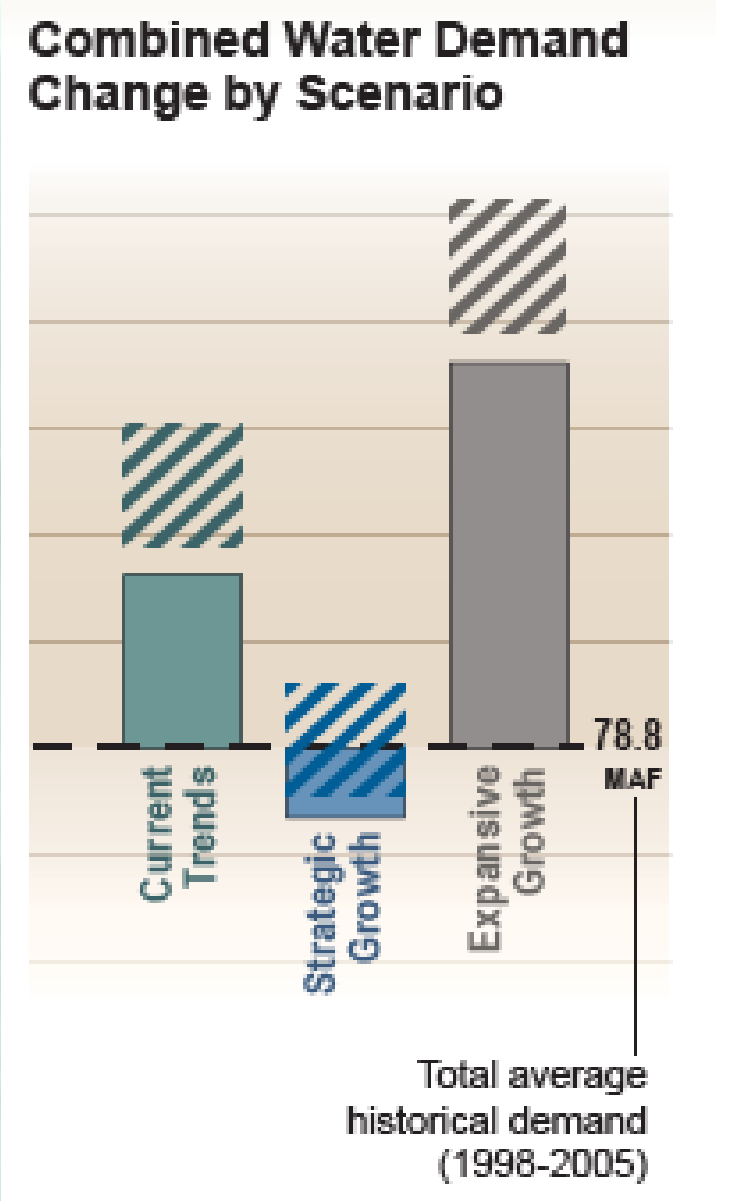
Scenario Analysis for Update 2013



Presentation Overview

- Vision for Water Plan Technical Analysis
- Application of Scenarios to Update 2009
- Proposal to Evaluate Resource Management Strategies for Update 2013

Vision & Purpose
for Analytical Tool and Data Improvements

- Vision
- Update 2009
- Update 2013 proposal

- Support decision making in light of uncertainties
  - Promote collaborative decision making, Shared Vision Planning
- Support integrated water management regionally and statewide
  - Supply reliability, flood management, environmental restoration, water quality, economic efficiency, social equity

- Vision
- Update 2009
- Update 2013 proposal

Water Plan Quantitative Deliverables

- Accurately describe recent water management conditions (Water Portfolios)
- Develop multiple baseline future conditions (Scenarios)
- Identify alternative water management response packages (management strategies)
- Evaluate performance of strategies in terms of benefits, costs, and tradeoffs
- Evaluate interaction between local, regional, and statewide water management
- Support Water Planning Information Exchange

- Vision
- Update 2009
- Update 2013 proposal

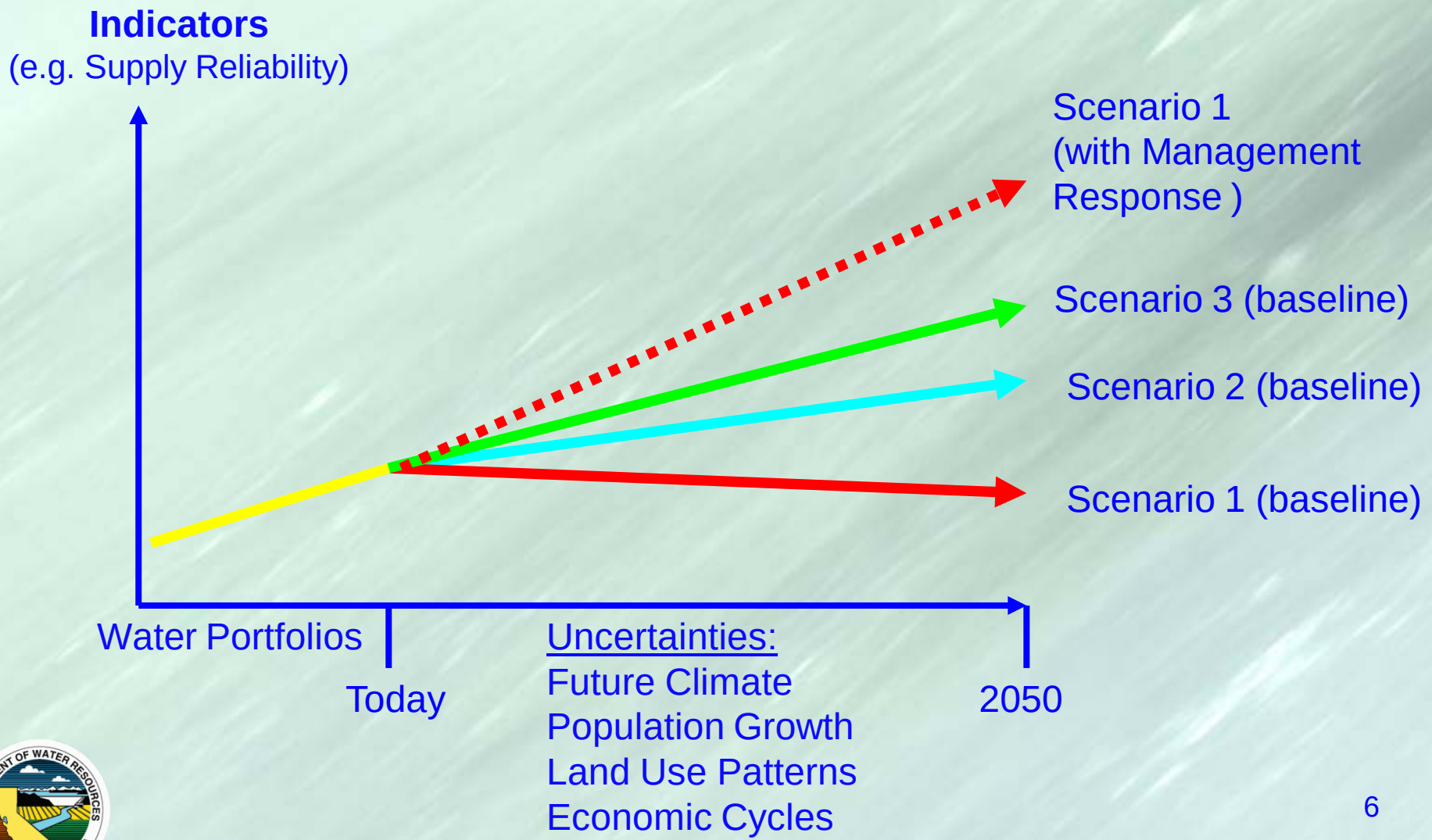
Water Plan Scenarios

Used To Consider Future Uncertainty

- Three plausible yet very different conditions during 2050 planning horizon
- Explore key uncertainties facing water community
- Factors water community has little control over
- Not predictions ---- used to evaluate water management responses

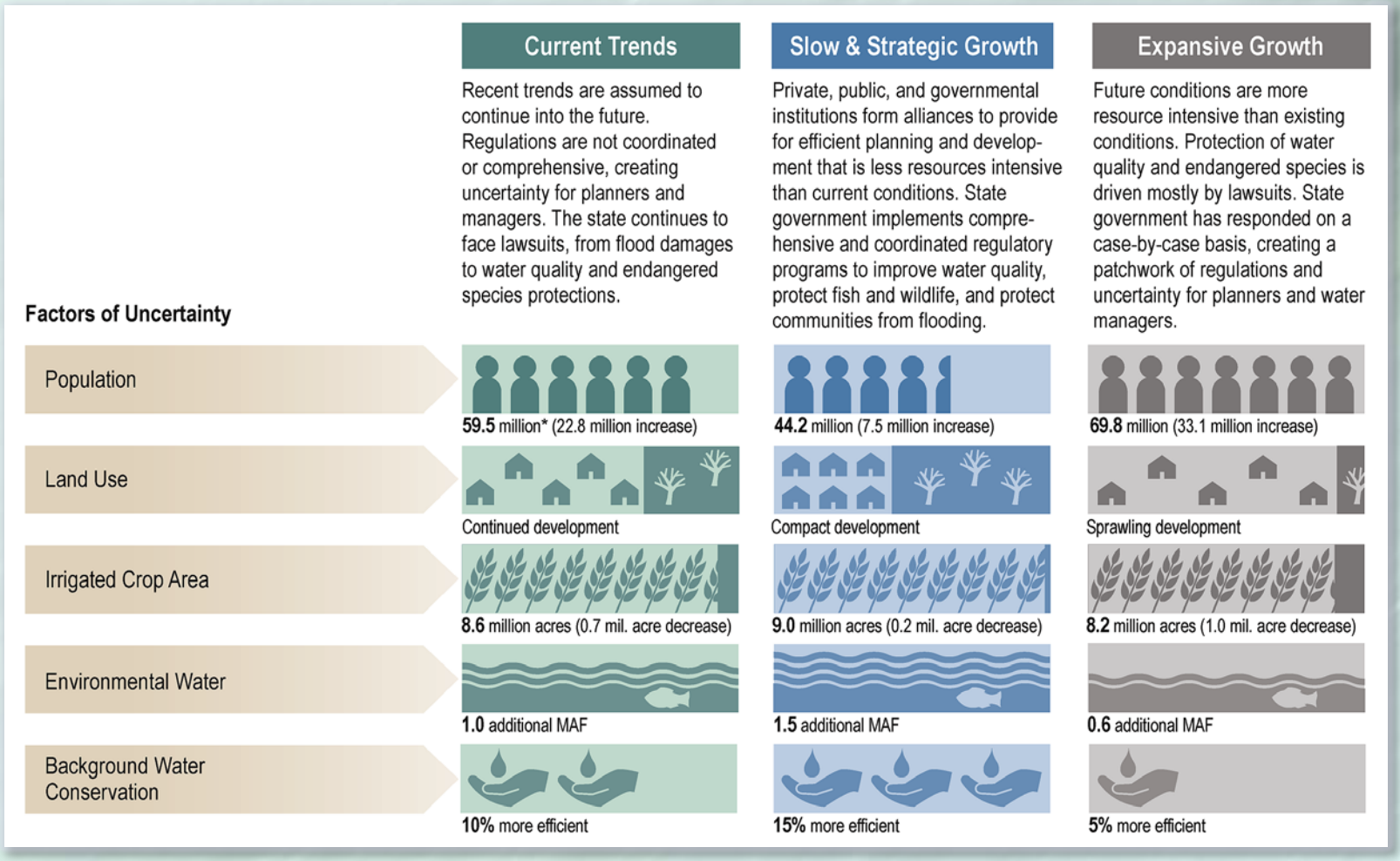
Scenarios and Water Management Responses

- Vision
- Update 2009
- Update 2013 proposal



CWP 2009 Demographic and Land Use Factors Drive Changes in Demand

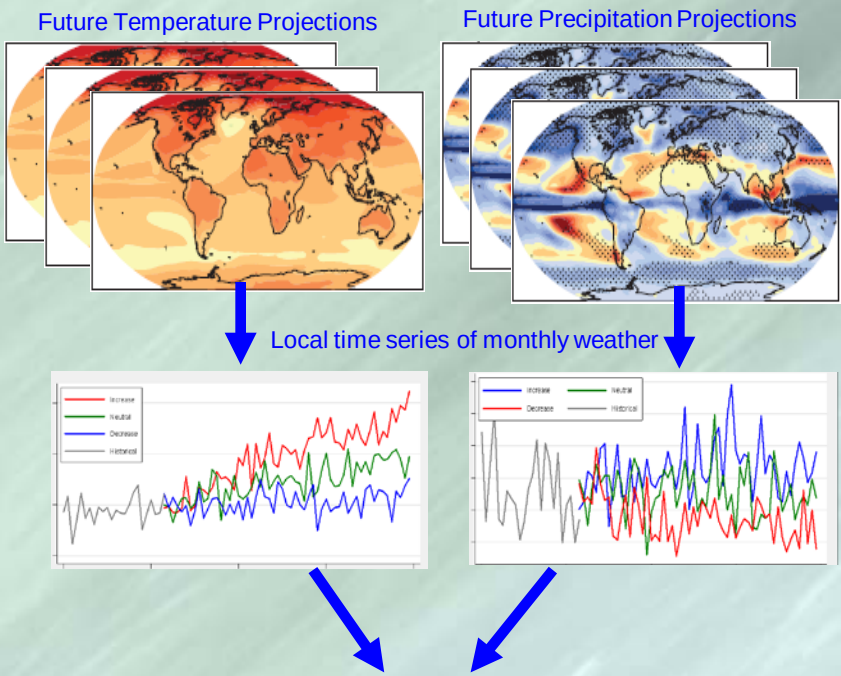
- Vision
- Update 2009
- Update 2013 proposal



Analysis Considers Possible Climate Change Impacts

- Vision
- Update 2009
- Update 2013 proposal

- **Global circulation models produce numerous projections of future temperature and precipitation patterns**
  - **Six GCMs**
  - **Two global emissions scenarios**
- **Statistical downscaling methods produce local weather sequences***
- **Weather sequences drive hydrologic models to calculate:**
  - **irrigation demand (HR and PA)**
  - **hydrologic flows (PA analysis, only)**

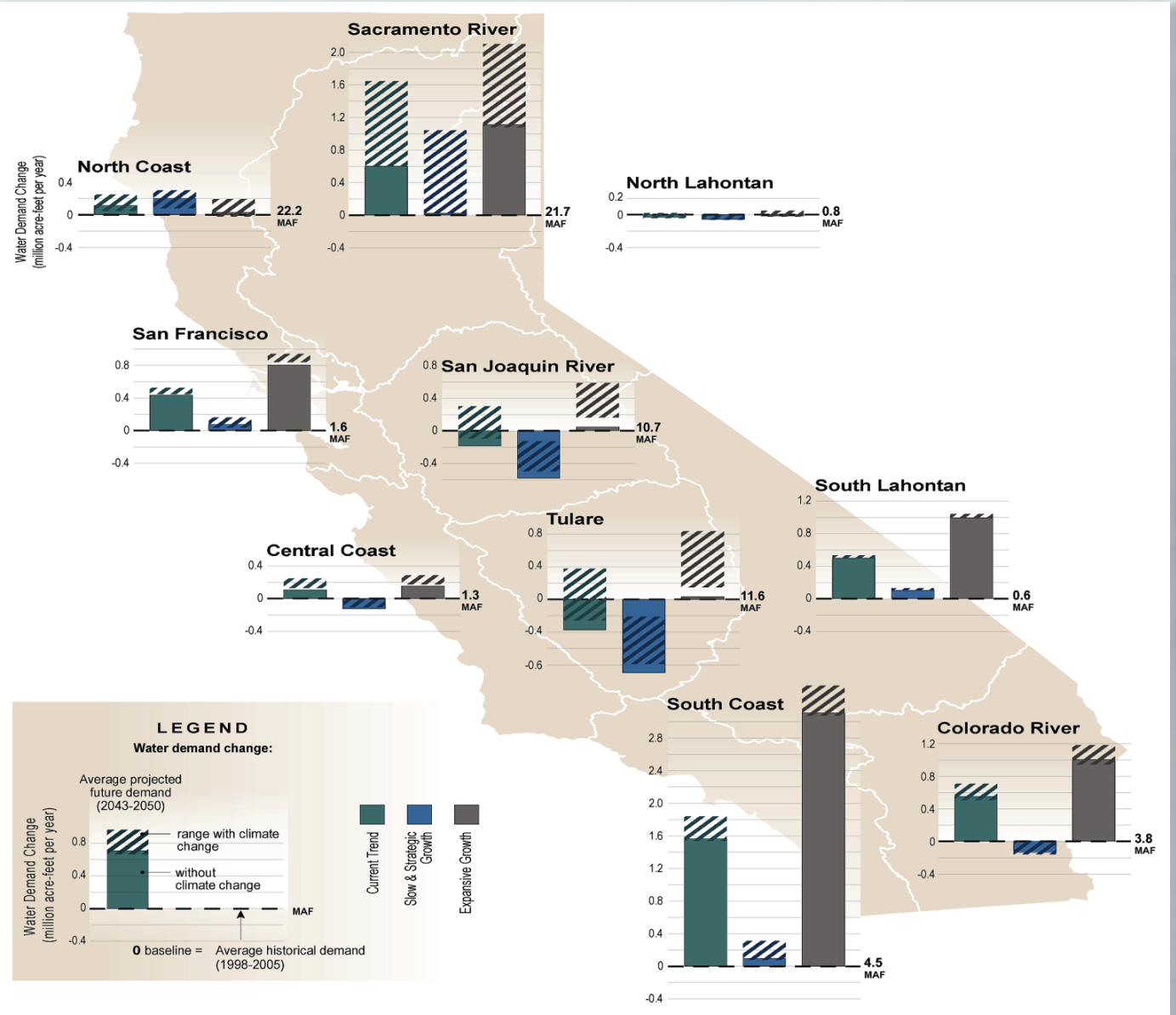


Hydrologic Model

* Using the World Climate Research Programme's (WCRP's) Coupled Model Intercomparison Project phase 3 (CMIP3) multi-model dataset

Regional Water Demand Changes by Scenario

- Vision
- Update 2009
- Update 2013 proposal



- Vision
- Update 2009
- Update 2013 proposal

Update 2013 Phased Approach

More detailed on Central Valley

- Uses new WEAP model developed to support the 2013 California Water Plan
  - Developed by SEI w/support from DWR, MWH, and RAND
- Three hydrologic regions
- Mountain and valley floor
- Study period is 2005 to 2050
- Collaboration with USBR

- Vision
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- Update 2013 proposal

Pilot Study Illustrates Application of Robust Decision Making (RDM) for Water Plan

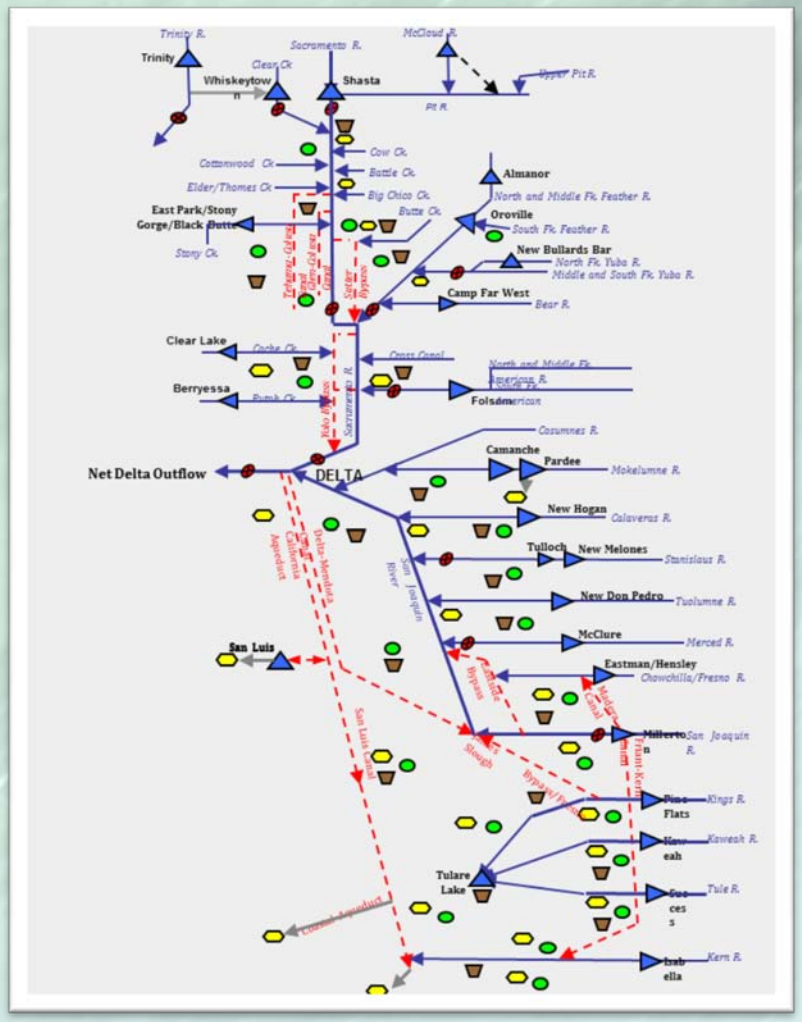
- RDM is an iterative, analytic approach that:
  - Considers *uncertainty* that is not easily characterized statistically
    - Future climate, land uses, environmental regulations
  - Systematically evaluates *options* to increase robustness of current strategies
    - Analysis guides development of new, adaptive strategies
  - Values outcomes across broad array of *metrics*
    - Accommodates wide range of objectives and values over outcomes

Water Evaluation And Planning (WEAP) Model

Integrates Hydrology and Water Management

- Vision
- Update 2009
- Update 2013 proposal

- Monthly temperature and precip. drive rainfall/runoff model
- Indoor demands:
  - Households / employees
- Irrigation demands:
  - monthly climate
  - land use patterns
- Network of rivers, reservoirs, conveyance, groundwater basins
- Linear program routes supplies to demand nodes according to supply preferences and priorities



Currently Evaluating Four Stylistic Response Packages

- Vision
- Update 2009
- Update 2013 proposal

Management Strategy	Urban Water Use Efficiency	Agricultural Water Use Efficiency	Conjunctive Water Management	Recycled Water Use
Baseline	0% Decrease in Urban Demand	0% Decrease in Agricultural Demand	None	No additional water recycling
Current Commitment	20%	0%	None	10%
Moderate Efficiency	30%	8%	None	10%
Aggressive Efficiency, Conjunctive Use, and Recycling	35%	12%	Broad development of conjunctive use	50%

Performance of Management
Initial Metrics for Pilot

- Vision
- Update 2009
- Update 2013 proposal

- Average annual unmet urban water demand
  - Sum of indoor and outdoor demand
  - Totaled across all planning areas
- Average annual unmet agricultural water demand
  - Totaled across all planning areas
- Environmental performance
  - Six in-stream flow requirements (IFRs) captured monthly
  - Percentage of missed monthly targets across all IFRs and years

- Vision
- Update 2009
- Update 2013 proposal

Areas Outside of Central Valley

- Apply simpler Hydrologic Region model developed for Update 2009
- Quantify regional water demand
  - o 3 growth scenarios
  - o 12 climate scenarios
- Ability to include some demand management strategies
- Limited ability to quantify most water management responses

- Vision
- Update 2009
- Update 2013 proposal

Schedule

- May 2011 - SWAN workshop on pilot results
- May 19 – advisory committee meeting
- Summer 2011 – regional outreach
- Fall/Winter 2011/2012 – Implement proof of concept
- 2012 – Scenario refinement and outreach
- 2013 – Complete Scenarios

- Vision
- Update 2009
- Update 2013 proposal

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